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Some Aspects of Increasing the Effectiveness and Comfort of the Scientific and Educational Process in University Electronic Environment – A Research Report

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Abstract

The research presented in the article seems to confirm the assumption that e-learning and ICT development contribute to the quality of educational services, to the development of information society competences and to the increased competitiveness of institutions of science and education. E-learning participants aim at: increasing comfort in the scientific and educational process; lifelong learning goals; the personalization of education; the formation of new scientific and educational cooperation and intercultural competence; self-fulfilment in education and work; increased openness of the scientific and educational environment; and enhancing self-organizational effects which support the sustainable development of the university environment. The research was conducted at the University of Silesia within the framework of IRNet project.

Keywords: *ICT, e-environment, international research network, survey, educational and research activities, e-learning*

Introduction

As stressed by Sue Greener (2015): "It is easy to imagine this globally connected world as a single space, a space with no frontiers, no boundaries, everything accessible and understood". Further she stated, "We know, of course, that this is not the

case. That everywhere there are frontiers and discontinuities and barriers to be surmounted." (Greener, 2015).

Rapidly developing technology and the changing needs of the modern labour market suggest that today's high school prepares students for careers that do not yet exist, for technologies that have not been invented, and directs them to solve problems that are not yet identified as such. That is why universities must primarily teach students to learn independently on the basis of a high motivation to learn, according to the requirements of the labour market and its development, taking into account the challenges of the information society, which is rapidly progressing thanks to the rapid development of information and communication technologies (ICT), and in particular the penetration of the Internet and its services into contemporary people's lives. (Morze, Smyrnova-Trybulska, Umryk, 2015).

Extensive research is being done into the use of LMS in education. For example, such aspects are studied as enhancing the quality of administration, teaching and the testing of computer science using a learning management system (Cápay and Tomanová, 2010), experience in the use of LCMS in medical education and implementation of knowledge evaluation according to the QTI standard (Roszak et al., 2014).

In the study (Visser-Wijnveen et al., 2016), a questionnaire was developed on the basis of categorizations of the research–teaching nexus in literature. The aim of the Student Perception of Research Integration Questionnaire (SPRIQ) is to determine the factors which capture the way students perceive research integration in their courses.

Researchers in different countries are conducting studies in the area of increasing the quality of education in e-environment conditions while the world is changing, new technologies are being developed, conditions of work and learning are constantly evolving, and new challenges are surfacing.

One of the most effective modes of conducting research is international research networks which provide opportunities for collective research, collaborative study and a permanent exchange experience. One such network is the IRNet ("The International Research Network for the study and development of new tools and methods for advanced pedagogical science in the field of ICT instruments, e-learning and intercultural competences"), with participation of ten universities from nine countries from Western, Central, and Eastern Europe and from Australia (www.irnet.us.edu.pl): the University of Silesia in Katowice, Poland, the University of Twente, the Netherlands, the University of Extremadura, Spain, Lisbon Lusíada University, Portugal, Ostrava University, the Czech Republic, Constantine the Philosopher University in Nitra, Slovakia, Curtin University in

Perth, Australia, Borys Grinchenko Kyiv University, Ukraine, the Herzen State Pedagogical University of Russia, St.Petersburg, Russia, Dniprodzerzhinsk State Technical University, Ukraine.

Within the framework of Work Package 2 (WP2, one among seven WPs) referred to as an analysis of the state of legal, ethical, human, technical and social factors of ICT and e-learning development and intercultural competences in every partner country, during an analysis of the legal documents of 9 IRNet countries and 10 universities a comparison of the legal factors of ICT and e-learning development in the different partner countries was made, and identical, similar, overlapping data and differences in state policies and university regulations in different project partners were found (Smyrnova-Trybulska, 2014), (Kommers et al., 2014, 2015), others.

Research Methodology

The Research methodology of WP3 – "Analyses and evaluation of the ICT level, e-learning and intercultural developments in every participating country" was elaborated, discussed and reviewed. The main objective was to define the system of indicators for developing e-learning and ICT competences. Firstly, the main benefits of e-learning and ICT in education were described (the improvement of educational services; the formation and development of an information society's competences; finally, the increased competitiveness of institutions in science and education. Then, the manifestations of these benefits were specified as well as their determinants (electronic space and interactions, the level of participants' competences).

The hypothesis of the WP3 research was that e-learning and ICT development contribute to the quality of educational services, to the development of information society competences and to the increased competitiveness of institutions of science and education. E-learning participants aim at: increasing comfort in the scientific and educational process, lifelong learning goals; the personalization of education; the formation of new scientific and educational cooperation and intercultural competence; self-fulfillment in education and work; an increased openness of the scientific and educational environment; and finally, enhancing self-organizational effects which support the sustainable development of the university environment.

The Research Results of Students' Opinions Regarding the Educational, Communicative and Scientific Aspects in the Conditions of a University Electronic Environment

In WP3, analyses and evaluation of the ICT level, e-learning and intercultural developments in every participating country was conducted. The research methodology and research instruments were developed, namely two questionnaires (for academic teachers and for students) were prepared as research instruments. Both questionnaires needed to determine how students and academic teachers use e-learning and ICT in education – particularly, how their effects are reflected in teachers' and students' activities. The questionnaire for students consists of 13 questions and 18 questions for academic teachers. The diagnostic research instrument was translated into the students' native languages and presented on-line by means of the university LimeSurvey system by the author of the article.

Some of the results of the research, conducted within the framework of IRNet Project and WP3 at the University of Silesia (US) and at the Faculty of Ethnology and Sciences of Education allow for the development of a picture of today's student in the context of educational inquiry, network activities as well as in the framework of the development of ICT competences. The respondents included 100 students pursuing pedagogical specialisation programmes such as preschool and early education, early education and pedagogical therapy, cultural animation, a disabled person's assistant programme, and 23 academic teachers.

Indicators of students' competences:

- Acquisition of information tools and understanding ICT role in education
- Learning activities
- Self-development, self-realization, research, scientific activities
- Social and cultural activities

The data obtained at the University of Silesia show that contemporary students are active Internet users.

The first group of questions concerning Effect 1: The expansion of space-time coordinates (improving the scientific and educational process comfort zone, and focusing on lifelong learning goals) (Understanding the potentialities and role of using ICT in teaching). This group includes three questions, one of them Z3: "Choose the most important, from your point of view, indicators of comfort of the electronic environment of your university". The variants of answers chosen by the students to the 3rd question were as follows: "Availability of Wi-Fi access points" – 47.00%, "Opportunity to use one's own gadgets" – 10.00%, "Availability of electronic educational resources in different formats (video, audio, hypertext,

etc.)" – 11.00%, "University website with relevant information for students, with comfortable navigation" – 16.00%, "Availability of distance support for individual disciplines (tasks in electronic form, electronic journals, discipline websites or e-learning platform Moodle)" – 8.00%, "Availability of fast feedback from teachers" – 8.00%. Most of the students (51.00%) answered: "If it allows you to perform tasks at your own pace, more comfortably". This indicates that the students greatly appreciate the opportunity to use the resources and services of the electronic environment of their university.

The second group of questions was focused on students' opinions regarding the personalization of educational activities, individual requests in e-learning (Application – use in self-development, self-realization, research scientific activities). The students' answers to two questions were as follows: Z4. "Should teachers take into consideration students' educational requests, their interests and needs while creating electronic resources in educational environments (presentations, websites, tests, video lectures, etc.)?". Answer 1: "No, they should not – I can use the resources in accordance with their needs" – 17.00%, Answer 2: "Yes, they should provide resources adapted to my individual needs" – 83.00%.

Next question Z5: "What additional electronic educational services would you like to see provided at your university?" The answers were: "Studying foreign languages" – 44.00%, "Acquiring an additional profession" – 36.00%, "Information on start-up companies and students' businesses" – 20.00%

Students' expectations can be effectively met by attending foreign language courses offered on the UPGOW platform (University is a Partner of the Economy Based on Knowledge); the author of this paper was involved in creating this platform as a methodological consultant and e-learning expert (http://el.us.edu.pl/upgow).

The third group of questions focused on students' attitudes to scientific and educational relationships, cooperation and their understanding of the role of ICT in maintaining these activities (Social and cultural activities). The sample questions and answers are given below:

With respect to question Z6 "Evaluate the need for cooperation in solving educational problems (group work and teamwork, etc.)? (This was a single choice question)" the following answers were chosen by respondents, accounting for the following percentages: "These objectives are not set by the teachers" – 16%, "Teachers offer tasks that require cooperation for successful solving" – 33%, "I strive to cooperate and ask teachers to offer such tasks" – 18%, "Such competences are needed to be successful in life" – 22%, "Without such competences it is impossible to be successful in business, e.g., when creating start-ups" – 11%.

The answers to question Z7: "Do you use social services, such as social networks, for collaboration and teamwork? (A single choice question)" were as in Figure 1:

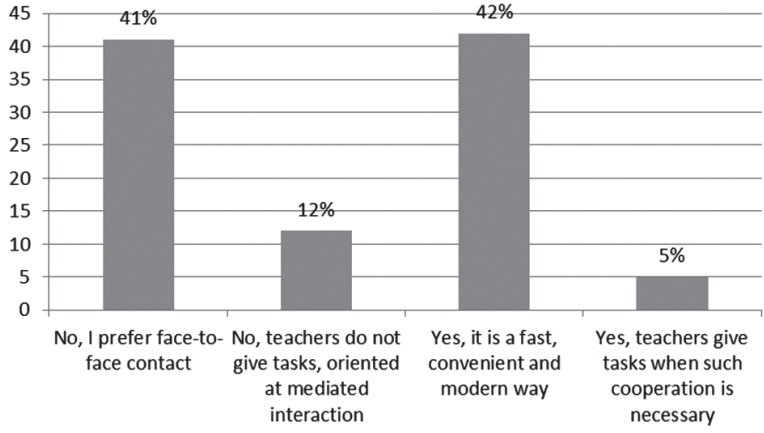

Figure 1. Answers to question Z7

Among the respondents' answers to question Z8: "Specify the main reason for your participation in virtual communities of students (scientific, artistic, sports ones, etc.) in social networks or other Internet services" (A single choice question) the following distribution of answers was received (Figure 2).

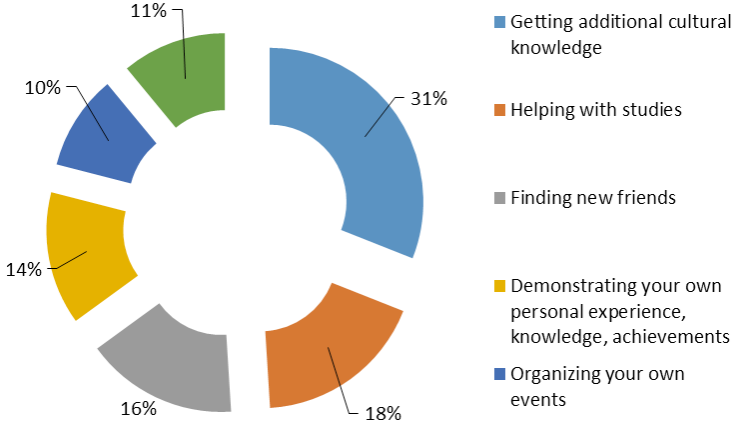

Figure 2. Answers to question Z8

The fourth group of questions was focused on increasing opportunities for self-realization in educational and professional activities. The sample questions are below: Z9 "Choose the reasons motivating you to demonstrate in the university electronic environment, the results of your academic, artistic, sporting activities (on the university website, in social networks, etc.) (Application – use in self-development, self-realization, research, scientific activities) and question Z10 "Choose which informational resources you use most often when doing assignments, doing research, preparing reports, etc. (Application – use when studying)

The students' answers to the single choice questions and generally their declaration of approach to the increasing opportunities for self-realization in educational and professional activities, support of initiatives are relatively high in percentage terms, but not well organized, coordinated or consciously structured and targeted. At the same time, nearly 18% of the students, for the 1st questions chose "An opportunity to be noticed by a potential employer". Probably this results from the activities of the university's Office of Careers in the area of student training and promotion of young people, in particular, on the Internet.

The fifth group of questions related to Effect 5: The increase in the degree of openness of the scientific and educational environment, expanding the influence of the university on external cultural environments; the positioning of the participants in the research and education community (Understanding the potentialities and role of using ICT in teaching) and includes question Z11: "Choose what elements of the university electronic environment can influence your choice to study at it. The following were the variants of answers (in % chosen by students) (Figure 3):

Practically speaking, all the answer variants were given similar scores, but the largest percentage of the students (22%) chose "Massive online courses, provided by the university" – 22.00% as an element of the university electronic environment that can influence ones' choice to study at it. This means that in addition to classic subject-specific remote courses, the students expect to be able to attend MOOCs, which are characterized by a larger scale, both in terms of the number of students from various parts of the world (for an unlimited number of students), and content (wider range of materials, and in terms of activities – in addition to materials usually presented during classic courses, such as lectures, quizzes and problems to solve, access is provided to videos (tutorials), interactive forums and wiki. Those attending such courses can receive certificates that confirm the skills gained and that are credited towards the completion of a module or itself constitute a module. Consideration should be given to developing such courses for students from the University of Silesia and for the entire international consortium. As part of the IRNet project (WWW.irnet.us.edu.pl), which is coordinated by the author of this

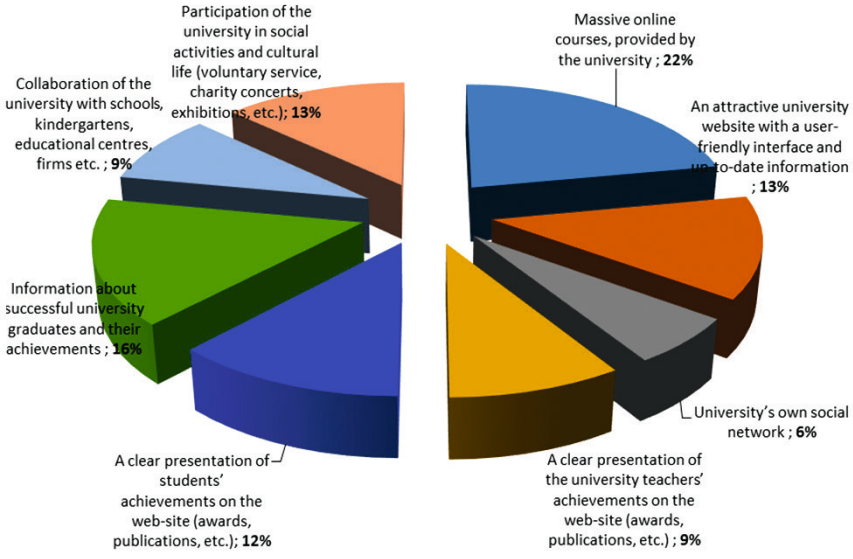

Figure 3. Answers to question Z11

article, it is intended to develop a course referred to as" IT-Tools for the effective use of education" in various languages (videos with subtitles) (http://el.us.edu.pl/irnet).

The sixth group of questions relate to Effect 6: Enhancing self-organizational effects that support sustainable development of the educational environment of the university and its participants and includes two questions: Z12 "Select an educational activities strategy that you prefer" (Understanding the capabilities and role. Possession). The following were the variants of answers (Figure 4).

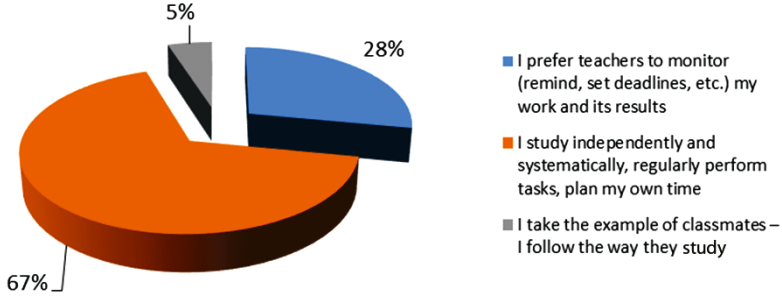

Figure 4. Answers to question Z12

As for the questions of the last group relating to Effect 6: Enhancing self-organizational effects that support the sustainable development of the educational environment of the university and its participants, 67.00% of the students chose "I study independently and systematically, regularly perform tasks, plan my own time" and "Yes, they (information technology instruments) will help greatly in planning and organizing one's own educational and extracurricular activities" – 59.00%, which indicates that student are capable of organizing their independent study quite well, above all thanks to the well-designed and functioning space of the information and communication university e-environment, in particular, of the Faculty Distance Learning Platform (based on the Moodle system, and including more than 60 e-learning courses, a project platform, an e-library, a USOS system for university students and lecturer support, and other e-services for teaching and learning support).We received survey results regarding this aspect of education strategies as perceived by the students, which is very interesting, especially in the context of lifelong learning. Simultaneously, most of the students – 2/3 (67%) prefer "Studying independently and systematically, regularly performing tasks, planning my own time". To the question "Will the information technology instruments (electronic diaries, organizers, calendars, reminders, etc.) help you in the planning your own educational and extracurricular activities? (Single choice question)" – 59% of the young respondents' answers were "Yes, they will help greatly in organizing". It is possible that one of the reasons for such an opinion is the introduction of an Information Technology course, taught during the first year at the university (30 h).

When analyzed using statistical tools (Statistical software tools to view and conduct an analysis of knot groups to select a statistical procedure or a graph that we want to draw for groups determined by the values of the variable selected) it was possible to investigate the existing correlations based on specific variables. There is a significant correlation between variables Z3 and Z5 (at the 0.27 level, $p < 0.05$, $N = 100$); Z3 and Z9 (0.21), Z4 and Z13 (0.23).

This means that the answers to question Z3 "Choose the most important, from your point of view, indicators of the comfort of the electronic environment of the university. Application – the use in self-development, self-realization, research, scientific activities" correlate with the answers to question Z5: "What additional electronic educational services would you like to see provided at your university?" (at the 0.27 level, with $p < 0.05$, $N=100$);

After an analysis with a statistical tool it was found that the answers to question Z3 "Choose the most important, from your point of view, indicators of the comfort of the electronic environment of the university. Application – use in self-develop-

ment, self-realization, research, scientific activities" and to question Z9. "Choose which informational resources you use most often when doing assignments, doing research, preparing reports, etc. (a single choice question)" showed correlation at the 0.21 level, with $p < 0.05$, N=100);

The answers to Question: Z4. "Should teachers consider students' educational requests, their interests and needs while creating electronic resources in the educational environment (presentations, websites, tests, video lectures, etc.)?" correlates with the answers to the question "Z13. Will the information technology instruments (electronic diaries, organizers, calendars, reminders, etc.) help you in the planning your own educational and extracurricular activities? (at the 0.23 level, with $p < 0.05$, N=100).

Besides, the research results show that the students' preferences concerning types of classes are as follows: 58.57% of the students prefer classes via the Internet, assuming that they are taught by the same person. First of all, such results and the students' positive preferences concerning classes via the Internet and the use of e-learning courses are determined by the systematic use of the faculty distance learning platform.

Conclusions

In summary, what should be highlighted is the value and multipurpose character of the internet services of the Faculty of Ethnology and Sciences of Education and the University of Silesia, coordinator of the IRNet project, which helps to identify the right solutions for different educational, academic, scientific and social issues that have proved to be difficult or impossible to solve in a conventional manner.

Students' competence should be also considered in terms of ICT and e-learning as well as their experience, expectations, along with the need to adapt the e-space faculty and university to their requirements.

After an additional analysis of the survey results, the author of this article and the international consortium will take steps to improve the e-environment infrastructure. There are also plans to launch a new direction referred to as E-learning Management in the intercultural environment at some of the universities participating in the international consortium as part of the IRNet and Erasmus+, Erasmus Mundus projects. These results are consistent with the aims of the project – after a more detailed analysis these could be used to improve the quality of education, based on innovative methods and techniques as ICT and e-learning,

as well as to develop a friendly and functional IT infrastructure and educational e-environment of the University of Silesia and the partner universities.

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